



## ***Forced Performance Inc.***

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### **Forced Performance Recommendations for Motor Oil**

With the subtle advancements that have occurred with the 4G63 engine and power systems over the last decade, it is easy to overlook the fact that our engines – even the “low” power ones, are essentially race engines. With that in mind it is easy to see that the turbochargers on these engines are often operated in a manner that could be considered “abusive” or “destructive”, and that is OK with us.

We often observe our customers operating our turbochargers beyond their rated power outputs and max shaft speeds. We like this, and this is why our customers are the baddest MFr’s in the world, they know how to try hard and they know how to win year after year after year.

The most important thing to remember when you are hanging your ass out there over the edge (besides being SAFE) is that the only thing that keeps your power system from transforming itself into a cool looking pile of busted up trash is your motor oil. If you want the best protection against lubrication failure for your race engine then you need to use the proper motor oil. Race engines that operate with oil temps above 200F should run 20w-50 weight racing oil. GF-4 classification oil is NOT racing oil, GF-4 is emissions priority oil that basically has all of the high pressure additives removed from it to avoid damaging catalytic converters and reduce tailpipe emissions. I know that your filler cap on your motor says use Mobil 1 5w-30 – you may remove the sticker at this time and stop believing that what was good for your 270bhp motor is still good for your 650bhp motor, it is not.

Some might have a hard time considering that their daily driver 4G63 motor is a “race engine”, but anything that makes 100bhp per piston is a race motor, and if you think otherwise then you are fooling yourself. Our own 2006 EVO9 RS is a 630whp daily driver. Most of its life it runs on 93 octane fuel at a reduced power level of approx 560whp – 140whp per piston – WELL into the “race engine” category. If you have any doubts about that just stop by and ask for a ride. Other than during the initial ring seat/break-in period, this engine has ALWAYS run Brad Penn 20w-50 racing oil. There are also plenty of other suitable oils available from Amsoil, Joe Gibbs, Valvoline and Royal purple for example that fall into the same basic performance level for high pressure - friction protection. Running oil that does not offer this type of high pressure oil film strength in your engine is just a mistake, plain and simple. Mobil 1 used to be considered such oil, but it has been many years since it was reformulated and “watered down” to accommodate OEM emissions and fuel efficiency requirements. Your engine does not have any fuel efficiency requirement; you do not have a catalytic convert on your race engine either, so why run oil whose main focus doesn’t pertain to your needs?

Our EVO9 RS (Only4 around the shop) has NEVER experienced a thrust bearing failure, and we had not been able to reproduce a thrust bearing failure despite some very serious efforts to do so in house and on the track. In fact the same thrust bearing was REUSED in multiple test turbos over a 2 year period without steel on

steel contact. Hundreds of R&D dyno pulls, and hours of full power track testing and we could not repeat a thrust bearing failure mode until now. I will tell you how we did it.



We drained the Brad Penn 20w-50 oil from the motor. We filled up with Napa brand natural 10w30 motor oil and drove around the block to warm the oil up, then we changed it again with more Napa brand 10w-30 motor oil and drove that around the block again and then changed the filter and filled up with Mobil 1 10w-30 motor oil and put a BRAND NEW FP BLACK™ turbo on the car. We drove the car for 3 days of street commuting before we could get a dyno appointment at Cobb tuning in Plano Texas, on the fourth day we went to the dyno to flog it out.

The dyno session consisted of 15 570whp-580whp 4<sup>th</sup> gear pulls and 3 15 second load holds at 5500rpm and 33psi boost pressure. The car appeared to be more or less fine afterwards despite blowing the dipstick out during the 3<sup>rd</sup> of the 15 second full power holds. We drove the car back to the shop and pulled the turbo to inspect the bearings. This is a procedure we have been through countless times before.

There were two things different in this test. The first thing was that we changed to Mobil 1 10w-30 and the second thing was the result, thrust bearing damage. The thrust bearing was starting to burn around the edges. The edges of the steel thrust collar and the tips of the steel thrust ramps had both turned blue from heat and started to smear the metal. Datalogs of the oil temp and pressure showed that both temp and pressure were virtually the same as with the Brad Penn oil, but the result is far from acceptable when using the Mobil 1 10W-30 engine oil.

So for the cliffs notes crowd out there, here is the summary: Do not use Mobil1 10w30 or any other “on highway” GF-4 oil in your 4G63 motor with any FP high output stock appearing turbo. Use a suitable racing oil designed for high film strength and heavy pressure loading such as Brad Penn, Joe Gibbs, Valvoline VR1, Amsoil Racing oil or Royal Purple racing oil. Also remember that racing oils are detergent free and need to be changed frequently.

A table indicating oil weights and ZDDP content is supplied below, suitable oils are highlighted in YELLOW.

BOOSTON!

Robert Young

Brad Penn Product	Part #	Lab		Classification	Price per quart	Comments
		Zinc	Phos			
Penn Grade 1 20W-50 #7119		1540	1319		\$ 4.95	
Penn Grade 1 10W-30 #7150		1565	1332		\$ 4.95	
PCMO 20w-50 SJ #7123*		1051	901			

Mobil One		Lab		Classification	Price per quart	Comments
		Zinc	Phos			
0W-20 Advanced Fuel Economy		800	900	GF-4, SM		
0W-30 Advanced Fuel Economy		800	900	GF-4, SM		
0W-40		1000	1100	SM	\$ 7.88	
5W-20		800	900	GF-4, SM		
5W-30		800	900	GF-4, SM, Honda HTO6		
5W-50		1000	1100	SM		
10W-30		800	900	GF-4, SM	\$ 8.49	
15W-50		1200	1300	SM		
5W-30 (Truck and SUV)		800	900	GF-4, SM		
5W-40 (Turbo Diesel Truck)		1100	1200	CJ-4, CI-4, CI-4 Plus, SM SL	\$ 8.05	
5W-30 (High Mileage)		900	1000	SL		
10W-30 (High Mileage)		900	1000	SL		
10W-40 (High Mileage)		900	1000	SL		
5W-20 (Extended Performance)		800	900	GF-4, SM		
5W-30 (Extended Performance)		800	900	GF-4, SM		
10W-30 (Extended Performance)		800	900	GF-4, SM		
5W-40 (ESP Formula M)		800	900	None		
5W-30 (ESP Formula)		800	900	CF		
10W-40 (Racing 4T)		1600	1700	SM, SJ, SH/CF, JASO MA		
20W-50 (V-Twin)		1600	1700	SG, SH**, CF, JASO, MA	\$ 10.95	

0W-30 Racing		1750	1850		\$ 15.96	
0W-50 Racing		1750	1850			

Joe Gibbs		Lab		Classification	Price per quart	Comments
		Zinc	Phos			
XP0 (~0W) synthetic						
XP1 (~5W-20) synthetic						
XP2 (~0W-20) synthetic						
XP3 (~10W-30) synthetic						
XP4 (~15W-50) petroleum						high zinc content
XP5 (~20W-50) semi-synthetic						
XP6 (~15W-50) synthetic						
XP7 (~10W-40) semi-synthetic						high zinc content
XP8 (~5W-50) petroleum						high zinc content
Synthetic 10W-30					\$ 9.99	high zinc content
Conventional 10W-30					\$ 9.99	high zinc content
Synthetic 15W-50					\$ 7.99	high zinc content
Conventional 15W-50					\$ 7.99	high zinc content

Amsoil		Lab		Classification	Price per quart	Comments
		Zinc	Phos			
Signature Series 0W-30 100% Synthetic Motor Oil	SSO			ILSAC GF-4	\$ 10.50	
SAE 0W-20 100% Synthetic Motor Oil	ASM			ILSAC GF-4	\$ 9.45	
SAE 5W-30 100% Synthetic Motor Oil	ASL			ILSAC GF-4	\$ 9.15	
SAE 10W-30 100% Synthetic Motor Oil	ATM			ILSAC GF-4	\$ 9.15	
SAE 5W-20 XL Synthetic Motor Oil	XLM			ILSAC GF-4	\$ 6.95	
SAE 5W-30 XL Synthetic Motor Oil	XLF			ILSAC GF-4	\$ 6.95	
SAE 10W-30 XL Synthetic Motor Oil	XLT			ILSAC GF-4	\$ 6.95	
SAE 10W-40 XL Synthetic Motor Oil	XLO			API SM/CF, SL, SJ ...	\$ 7.05	
100% Synthetic 5W-40 European Engine Oil	AFL			API SM/CF	\$ 9.20	
SAE 10W-40 Synthetic Premium Protection Motor Oil	AMO	1378	1255	API SL, SJ, SH, SG	\$ 9.00	heavy treatment of zinc
SAE 20W-50 Synthetic Premium Protection Motor Oil	ARO	1379	1266	API SL/CF, CI-4 Plus	\$ 9.25	superior high-zinc additive package

Dominator 5W-20 Racing Oil	RD20	1575	1424	none	\$ 10.90	heavily fortified with zinc and phosphorus
Dominator 10W-30 Racing Oil	RD30	1575	1424	none	\$ 11.00	heavily fortified with zinc and phosphorus
Dominator 15W-50 Racing Oil	RD50	1575	1424	none	\$ 11.50	heavily fortified with zinc and phosphorus
Super Heavy Weight SAE 60 Racing Oil	AHR			none	\$ 11.30	

Royal Purple		Lab		Classification	Price per quart	Comments
		Zinc	Phos			
SAE 0W-40	11484	1000			7.63	
SAE 5W-20	01520				7.63	
SAE 5W-30	01530				7.63	
SAE 5W-40	01540				7.63	
SAE 10W-30	01130				7.63	
SAE 10W-40	01140				7.63	
SAE 15W-40	01154				7.63	
SAE 20W-50	01250				7.63	
XPR 0W-10	01009				14.99	
XPR 5W-20	01011				14.99	
XPR 5W-30	01021	1200			14.99	
XPR 10W-40	01041	1200			14.99	
XPR 20W-50	01051	1200			14.99	

Castrol		Lab		Classification	Price per quart	Comments
		Zinc	Phos			
Castrol Syntec 20W-50		1200	1200			

Valvoline		Lab		Classification	Price per quart	Comments
		Zinc	Phos			
All Premium Conventional Grades		830	760	ILSAC GF-4	\$ 3.99	
DuraBlend Synthetic Blend		830	760	ILSAC GF-4	\$ 5.80	
MaxLife		830	760	ILSAC GF-4	\$ 6.55	
MaxLife Full Synthetic		830	760	ILSAC GF-4	\$ 7.55	
<a href="#">SynPower® Full Synthetic Motor Oil</a>		830	760	ILSAC GF-4	\$ 7.19	
<a href="#">VR1 Racing Oil (VR1) 10W-30, 20W-50</a>		1400	1300	API SM/CF, SL, SJ ...	\$ 4.99	High zinc/phosphorus
<a href="#">Valvoline® NSL Synthetic 5W-30, 10W-30, 20W-50</a>		1400	1300	API SM/CF, SL, SJ ...	\$ 8.99	High zinc/phosphorus